

inches of the great flood of 1847. Cumberland City. 20th, railroad track 20 inches under water; all trains between this point and Paris, 65 miles distant, abandoned. Memphis, 15th, occasional drift in river. 16th, river overflowed opposite the city. 21st to 25th, heavy drift in river. 25th, river rising rapidly and now 34 feet 2 inches above low-water mark. 26th, river 34 feet and 4 inches above low-water mark and 4 inches above the danger-line. Track of the Memphis and Little Rock R. R. partly submerged. 27th, river 34 feet and 7 inches above low-water mark and 7 inches above the danger-line, with occasional drift. Wolfe river rising rapidly and moving with a "powerful current." 28th, river 34 feet and 9 inches above low-water mark and 9 inches above the danger-line; much drift in river. 29th, intervening country between station and Marion, Crittenden, Co., Arkansas, almost entirely submerged. At the latter place water five inches higher than ever before recorded; water running through the streets; many houses flooded and others surrounded. 31st river 34 feet and 11 inches above low-water mark and 11 inches above the danger-line. Memphis and Little Rock R. R. entirely submerged; passengers and baggage transported by aid of boats. Columbia, 21st, river has been subject to a series of heavy rises since the opening of the year. Much damage sustained by farmers along the line of the river, from the flooding of fields and the washing away of fences and other property. Knoxville, 17th, river higher than for many years past. Heavy land-slides occurred on the East Tennessee, Virginia and Georgia R. R. 28th, water in First creek higher than ever before known. In the flats east of the city many dwellings flooded and a large amount of property surrounded by water. Chattanooga, 18th, river above the danger-line and lower portions of the city submerged. 19th, river rising. 29th, river falling.

**High Tides.**—Delaware Breakwater, 18th, 19th, Indianola, 22th, 26th.

**Low Tides.**—New Haven, 22d, very low; Newport, 23d, unusually low, water about 3 feet below mean low tide. Between Camden and Philadelphia, 23d, high winds caused lowest water on the Delaware ever known before; several ferry boats ran aground on the bar, and other boats on the lower end of Windmill Island. New York, 24th, heavy northwest gale caused extremely low tide.

**Water Spouts.**—Warren Co., Tenn., 27th, p. m., near the head waters of Caney creek, one of the main tributaries of the Cumberland river.

#### TEMPERATURE OF WATER.

*The temperature of water*, as observed in rivers and harbors at Signal Service stations, with the average depth at which observations were taken, is given in the table on the left hand side of chart of No. III. Owing to the presence of ice or the breakage of instruments observations are wanting as follows: Alpena, 1st to 31st; Burlington, Vt., 23d to 31st; Escanaba, 2d to 31st; Buffalo, 4th to 7th, 22d to 26th, 29th to 31st; Cleveland, 22d to 24th, 27th to 31st; Duluth, 4th to 7th, 10th, 17th, 20th, 22d to 31st; Detroit, 2d to 31st; Chicago, 3d to 7th, 15th to 26th, 30th to 31st; Grand Haven, 4th to 9th, 14th to 31st; Marquette, 3d to 7th, 17th to 25th; Milwaukee, 4th to 31st; Sandusky, 1st to 11th, 14th to 31st; Toledo, 1st to 31st.

#### ATMOSPHERIC ELECTRICITY.

**Auroras.**—The most remarkable display of the month because of the continuity of the line of observation and the numerous points at which the phenomenon was noted, was that of the 19th, the following stations reporting: Charlottetown, P. E. I., during the evening. Halifax, N. S., p. m. St. John's, N. B., during the evening. Fredericton, N. B., 9 p. m. Eastport, 8 p. m. to midnight; arch formed at 8.30 p. m.; 10 p. m., very brilliant, of a red, greenish tinge, dark segment below; had a wavy lateral motion from east to west. Portland, 7.30 p. m., arch extending over the entire northeastern portion of the heavens; was of a deep straw color. Mt. Wash-

ington, 7 p. m. to morning of the 20th; faint yellowish light extending from NW. to ENE. Burlington, Vt., 7 to 11.45 p. m., diffuse white light in the form of an arch; dark segment below, but not well defined. Thatcher's Island, 8 p. m. to midnight; bright streak of bluish white light in northern heavens; altitude 25° and azimuth 90°. New London, 7 to 9.30 p. m., arch well defined; altitude 20° and azimuth 15° E. to 10° W. New Shoreham, 9.15 p. m., faint arch of light; altitude 20°. Newport, 7.20 to 11.33 p. m., unusually brilliant; arch well defined from 8 to 8.50 p. m.; altitude 12° to 15° and azimuth 90°; centre of arch, bright white, with upper and lower edges tinged with red; arch reappeared at 9.30 p. m.; numerous beams rose out of the dark segment and were very bright at points where they intersected the arch. Bangor, Me., 7 p. m. to morning of 20th; during the early morning the display became very brilliant; a dense band of "leadened clouds" darkened the northern horizon; from behind the cloud bank, broad bands of the softest light streamed toward the zenith and encircled the northern sky in a gorgeous halo; disappeared only at the approach of day. New Haven, 9 p. m., very brilliant. Point Judith, R. I., 7 p. m. to morning of 20th, very brilliant. Springfield, Mass., 7 p. m., to morning of 20th, extended along the northern horizon in a direction from NNW. to ENE., altitude about 15°; dark segment below arch and well defined, being a prominent feature of the display; 9.45 p. m., several streamers shot upward near the eastern end of the arch, and later at other portions, with at times a wavy lateral motion; light constantly changing in brightness and extent of surface; at times there were two irregular parallel bands of light extending horizontally above the dark segment, separated from each other by a dark band about the density of the dark segment below the arch; after 10 p. m. the light began to fade, and the dark segment decreased rapidly in size. Agawam, Mass., 7.30 to 10 p. m., probably covered about half the northern horizon; breadth of band about 20°; no streamers. Cornish, Me., from dark to morning of 20th. Gardiner, Me., 6 p. m. to morning of 20th. Dexter, Me., visible most of night; very brilliant. Contoocookville, N. H., 9 to 10 p. m., bright arch, with dark segment below. Newport, Vt., 7 to 10 p. m. Woodstock, Vt., 8 to 9 p. m., extended across northern sky; altitude about 30°. Cambridge, Mass., 6 p. m., over dark sky; rather bright all the evening. Westborough, Mass., very brilliant. Williamstown, Mass., 7.30 p. m., bright arch, with small faint streamers above and dark segment below. Fall River, Mass., broad band in north-western sky, extending half way to the zenith; numerous streamers. Boston, 7 p. m., till after midnight, very brilliant. South Lee, Mass., 8 p. m., bright arch, with numerous streamers. Southington, Conn., 9 p. m., bright arch, with streamers. Madison Barracks, N. Y., 7 p. m. Ardenia, N. Y., 9 to 11 p. m., very brilliant. Brookhaven, N. Y., 8 to 10.30 p. m., very brilliant. Ithaca, N. Y., 8 to 11 p. m., bright arch, sharply defined with dark segment below; 10 p. m., two arches formed, were sharply defined, but quite irregular; at times the light seemed to concentrate in masses, resting on the dark segment, and again streamers shot upward to a height of 30°, with a lateral motion from west to east. North Volney, N. Y., 10.15 p. m. Palermo, N. Y., 9 p. m. Rochester, 8 to 11.15 p. m., horizontal bands of light, no dark segment below. Oswego, 7.30 p. m., to 2.30 a. m. of 20th, bright arch of light with streamers occasionally shooting to zenith; display constantly changing color from a reddish to a pale yellow. Atco, N. J., low bright arch, dark segment below, but no streamers. Somerville, N. J., 9 to 10.30 p. m., bright arch with streamers. Freehold, N. J., 7.30 to 9 p. m. Moorestown, N. J., 9 p. m., low distinct arch, no streamers. Princeton, N. J., during evening. Dyberry, Pa., 8 p. m., bright arch. Great Falls, Md., 9.15 to 10.15 p. m., bright arch with streamers. Toronto, during evening. Port Huron, 6 to 11.30 p. m., diffuse light, altitude 30°. Bellefontaine, O., 9 p. m., bright arch, with dark segment below. North Lewisburg, O., 8 p. m., long low arch. Ruggles, O., 8 to 9 p. m., diffuse light. New Cory-

don, Ind., 8 to 10 p. m., bright arch. Lansing, Mich., during evening. Riley, Ill., 7.20 to 10.30 p. m., bright arch, altitude 14°. Elmira, Ill., 9 p. m., faint bluish light, with streamers. Morrison, Ill., during evening. Dubuque, 7.10 to 10.30 p. m., very brilliant, altitude 30°; extended from N. 20° W. to N. 30° E. Beloit, Wis., during evening. Franklin, Wis., during evening. LaCrosse, 8.30 p. m. to 4 a. m. of 20th. St. Paul, 9 to 11.30 p. m., bright arch of pale yellow, altitude from 10° to 15°, no streamers. Northfield, Minn., 6 p. m. to 6 a. m. of 20th, Guttenburg, Ia., 7 to 10 p. m. Clinton, Ia., during evening, bright arch, altitude 20°, no streamers. Cresco, Ia., 7 to 10.30 p. m., diffuse light extending from NNW. to ENE. Monticello, Ia., during evening. Des Moines, 7 p. m., bright arch with dark segment below. Moorhead, Minn., 8 to 11 p. m., bright arch of pale yellow. Bismarck, 6 p. m. to morning of 20th, Rapid City, Dak., 7 to 10.30 p. m. Ft. Meade, Dak., during evening. The next most important display was that of the 14th, the line of observation extending eastward from Cape Breton Island to Dakota, the following stations reporting: Charlottetown, P.E.I., during evening. Fredericton, N.B., during evening. Eastport, 11.30 p. m., to midnight; diffuse light. Newport, R. I., 10.15 p. m., to morning of 20th, diffuse light; a few streamers rose to an altitude of 15° or 20°, but lasted only a few moments. Burlington, Vt., 11 to 11.45 p. m., bright arch with streamers reaching an altitude of 25°; no dark segment. Cambridge, Mass., 7.30 to 10.30 p. m. Southington, Conn., 9 p. m., faint light low down upon the horizon. Waterburg, N. Y., 9.30 p. m. Rochester, 10 to 11 p. m., faint light. Toronto, during evening. Lansing, Mich., during evening. Clear Creek, Neb., 9 p. m., faint light. St. Vincent, 7 to 11 p. m., very brilliant, with two arches; light frequently reached the zenith; forks of light characteristic of merry dancers extended along both arches; they increased in brilliancy on the western quarter of the arches and gradually faded away as they approached the eastern quarter. The following, with the exception of the 11th, were local displays: Fredericton, N. B., 15th. St. John, N. B., 15th. Eastport, 15th, 8.30 to 9.10 p. m., bright arch with several streamers, some of which shot upward to a height of 30°. Contookville, N. H., 11th, diffuse light. Thatcher's Island, 15th, 7 to 7.10 p. m., faint light. Cambridge, Mass., 11th, aurora suspected at 9.30 p. m. and at 11 p. m., a broken arch with a few streamers became visible. Southington, Conn., 11th, 9 p. m., faint light. Atco, N. J., 24th, 8 p. m., two faint arches resembling a double rainbow; no dark segment. Gardiner, Me., 11th, 8.30 p. m. to 12.30 a. m. of the 12th; 30th, 4.30 a. m. Dexter, Me., 12th. Waterburg, N. Y., 11th. Catawissa, Pa., 22d. Toronto, 11th. Rochester, 11th, 9 to 11.30 p. m., diffuse light. New Corydon, Ind., 23d, 6 p. m. to 2.30 a. m. of the 24th, three well defined arches, altitude, 30°; 24th, from early evening to morning of 25th. Lansing, Mich., 11th, during evening. Northport, Mich., 11th, 9 p. m. Alpena, 11th, 8.30 p. m. to 12.40 a. m. of 12th, diffuse light with a few streamers occasionally reaching near zenith. Grand Haven, 11th, 10 p. m. to 1.30 a. m. of 12th, resembling morning dawn. Beloit, Wis., 11th, during evening. Franklin, Wis., 11th, during evening. Cresco, Iowa, 11th, 8.30 to 9.30 p. m., faint light. Northfield, Minn., 11th, 9.15 to 10.20 p. m., bright streamers occasionally reaching an altitude of 45°. Cedar Rapids, Iowa, 13th; Clear Creek, Neb., 1st, faint light. St. Vincent, 10th, 8 to 11 p. m., diffuse light with a slight lateral motion; 23d, 7 to 11 p. m., faint light. Phelps, N. Y., 21st, bright arch of bluish white, altitude about 23° with an azimuth of over 110°; this condition remained intact for about two hours, when the arch broke into a number of large beams, having a slow but uniform motion eastward; light sufficiently brilliant to cast distinct shadows upon the snow.

**Zodiacal Light.**—Nashville, 9th, 11th, 14th; St. Vincent, Minn., 9th; Springfield, Ill., 14th; Dayton, Wash. Ty., 17th, 18th, 20th; Rio Vista, Cal., 16th to 20th; New Corydon, Ind., 9th, 14th, 17th, 19th; Clinton, Ia., 9th, 11th, 13th, 14th, 16th, 17th; Cresco, Ia., 8th, 11th, 14th, 16th, 18th, 19th, 21st, 22d; Monticello, Ia., 9th, 10th, 13th, 14th, 16th, 17th, 18th, 21st;

Yates Centre, Kan., 15th, 17th, 18th, 21st, 22d; Cambridge, Mass., 7th, 9th, 11th, 12th, 14th, 15th, 17th, 19th, 22d, 27th; Rowe, Mass., 19th; Clear Creek, Nebr., 8th, 10th, 11th, 13th, 14th, 16th to 21st; Bellefontaine, O., 14th; Stateburg, S. C., 15th, 16th; Wytheville, Va., 14th; Franklin, Wis., 11th, 12th, 13th.

**Thunder-storms.**—They were reported in the various districts as follows: Middle Atlantic States, Fallston, Md., 16th; South Atlantic States, 1st, 21st, 28th; East Gulf States, 8th, 10th, 13th, 27th, 28th; West Gulf States, 13th, 27th; Tennessee, Ashwood, 12th; Ohio Valley, 2d, 6th, 7th; Upper Lake Region, 8th, 26th; Upper Mississippi Valley, 2d, 6th, 7th, 8th, 26th; Lower Missouri Valley, 6th, 7th, 8th, 10th, 12th, 13th; Southern Slope, Jacksboro, Tex., 16th, 27th; Pacific Coast, San Diego, 12th, Red Bluff, 23d; San Francisco, 24th.

**Atmospheric Electricity Interfering with Telegraphic Communication.**—Bismarck, Dak., 19th, "sufficiently strong so that telegraph operator was able to work an open wire without the aid of battery. The current was so violent that it scorched the rubber covering of the wires and filled the room with the stench of burning compound. In placing the ends of the positive and negative wires together, a bright light about the size of a large shirt button was created, which rapidly revolved between the butts, illuminated the office."

### OPTICAL PHENOMENA.

**Solar halos** have been observed in the various districts on the following dates: New England, 1st, 5th, 10th, 12th, 16th, 18th, 20th, 21st, 28th, 31st; Middle Atlantic States, 1st, 4th, 10th, 12th, 15th, 16th, 19th, 27th, 30th; South Atlantic States, Hatteras, 21st; East Gulf States, Pensacola, 19th, 23d; West Gulf States, Little Rock, 14th; Rio Grande Valley, Eagle Pass, 3d; Ohio Valley and Tennessee, 1st, 9th, 11th, 14th, 15th, 17th, 19th, 23d, 24th, 27th, 29th, 30th and 31st; Lower Lake Region, 12th, 15th, 18th, 25th; Upper Lake Region, 3d, 4th, 5th, 12th, 14th, 16th, 18th, 19th, 23d, 24th, 27th, 28th; Extreme Northwest, Moorhead, Minn., 20th; Upper Mississippi Valley, 1st to 6th, 9th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 23d, 26th, 27th, 28th, 29th, 30th; Missouri Valley, 2d, 11th, 12th, 13th, 14th, 17th, 19th, 27th to 30th; Northern Slope, Rapid City, Dak., 3d; Deadwood, 27th, and North Platte, 29th; Middle Slope, 19th, 23d, 25th, 28th, 29th; Southern Plateau, Florence, Ariz., 4th, 7th; Middle Plateau, Pioche, 18th; Salt Lake City, 18th, 22d; Pacific Coast Regions, San Francisco, 3d, 9th, 11th, 15th, 22d, 28th; Poway, Cal., 27th; Sacramento, 22d, San Diego, 7th, 27th; Eola, Or., 29th.

**Lunar halos** have been observed in the various districts on the following dates: New England, 1st, 3d, 4th, 7th, 18th, 22d, 24th, 25th, 27th, 31st; Middle Atlantic States, 2d to 5th, 10th, 12th, 14th, 15th, 22d, 23d, 24th, 26th to 31st; South Atlantic States, 1st, 4th, 5th, 6th, 23d, 24th, 25th, 27th, 28th, 29th; Florida Peninsula, Key West, 24th; East Gulf States, 3d to 6th, 23d, 26th, 27th, 28th; West Gulf States, 1st to 4th, 6th, 9th, 25th to 28th, 31st; Rio Grande Valley, 2d, 3d, 4th; Ohio Valley and Tennessee, 1st, 3d, 6th, 12th, 23d, 24th, 26th, 27th, 28th, 29th, 30th, 31st; Lower Lake Region, 4th, 5th, 7th, 10th, 12th, 24th, 27th, 28th, 29th, 31st; Upper Lake Region, 1st to 5th, 8th, 9th, 10th, 14th, 15th, 19th, 23d, 27th, 29th, 30th, 31st; Extreme Northwest, 2d, 3d, 10th, 30th; Upper Mississippi Valley, 2d, 3d, 6th, 8th, 9th, 12th, 13th, 23d, 26th to 31st; Missouri Valley, 1st, 2d, 3d, 10th, 12th, 22d, 23d, 25th to 29th, 31st; Northern Slope, 1st, 4th, 11th, 13th, 22d, 23d, 25th, 26th, 29th, 31st; Middle Slope, 1st to 7th, 10th, 24th, 25th, 27th, 28th, 29th; Southern Plateau, 2d, to 6th, 27th to 31st; Middle Plateau, 1st, 3d, 4th, 5th, 24th, 26th, 29th, 30th; Northern Plateau, 24th, 29th, 30th, 31st; North Pacific Coast, 11th, 29th, 31st; Middle Pacific Coast, 5th, 11th, 22d, 27th, 30th; South Pacific Coast, Yuma, 2d, 5th, 13th, 28th; Poway, Cal., 27th. Exceptionally brilliant displays were observed at Pioche, Nev., on the 3d, from 7 p. m. to midnight, and at Council Bluffs, Ia., on the 31st, from about 8 to 11 p. m. The parhelic circle with the accompanying paraselenae were present in both instances.